REMARKS

Reconsideration is respectfully requested in view of the foregoing amendments and the remarks which follow.

Original claims 1-5 and 10 have been cancelled without prejudice or disclaimer.

Claim 6 has been amended to correct a typographical error.

Claim 9 has been amended to overcome the rejection under U.S.C. § 112, second paragraph. This amendment is supported in Table 1, Sample 6 at page 17 of the specification. Withdrawal of the rejection is respectfully solicited.

The claims presently pending herein are 6-9, inclusive.

It is respectfully submitted that claims 6-9 serve to overcome the rejection of these claims under 35 USC 103 (a) based on Koyama et al, U.S. Patent Application Publication 2003/0114291 A1 and the § 103 (a) rejection based on Landa et al., U.S. 7,169,722. These rejections are respectfully traversed.

Also, original claims 1-10 are provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-12 of co-pending Application No. 11/182,449. This rejection is respectfully traversed.

The Examiner is respectfully requested to consider the annexed table wherein certain features of the disclosures of U.S. Patent Application Publication 2003/0114291 A1; US Patent 7,169,722 and the co-pending Application No. 11/182,449, the prior art applied by the Examiner against claims 6-10, are compared amongst each other, including the ranges of components and the properties of the respective glasses.

The Koyama published patent application, US 2003/0114291, discloses a glass sheet that has a high transmittance with silica as a main component, and as coloring components, expressed in wt. %: not less than 0.005% to less than 0.02% of total iron oxide in terms of Fe_2O_3 (T-Fe_2O_3); and not more than 0.25% of cerium oxide; less than

0.008% of FeO; wherein the composition has a ratio (FeO ratio) of FeO in terms of Fe_2O_3 to T-Fe_2O_3 of lower than 40%; the glass sheet on 4.0 mm thickness basis has a dominant wavelength of 450 to 580 nm; a solar radiation transmittance of 87% or higher.; an excitation purity of 0.36% or lower; and a visible light transmittance of 90% or higher.

The Koyama published patent application does not claim **titanium dioxide.** However, notwithstanding Koyama's disclosure that **TiO_2** is not an indispensable ingredient, it also discloses that it can be added in a proper amount for the purpose of enhancing its ultraviolet-absorbing ability. Koyama discloses that when an excessive amount of TiO_2 is present in the glass composition, the glass is more likely to become yellowish, and the transmittance at a wavelength in the vicinity of 500 to 600 nm is decreased. Thus, Koyama teaches that the content of **TiO_2 must be limited to a low level, namely, in the range of less than 0.2% to avoid a yellowish coloration to the glass.** By contrast, in the case of the claimed invention, the **TiO_2 content is recited as being in a range from 0.05 to 1 wt % and does not suffer from a yellow coloration.**

The Landa et al patent, discloses a high transmittance fairly clear/neutral colored glass composition comprising: SiO_2, at least 67%; Na_2O, 10 to 20%; CaO, 5 to 15%; MgO, 0 to 8%; Al_2O_3, 0 to 5%; K_2O, 0 to 5%; a colorant portion comprising: total iron (expressed as Fe_2O_3), 0.04 to 0.10%; cobalt oxide, 0.1 to 15 ppm; chromium oxide; 0 to 10 ppm; titanium oxide, 0 to 0.5%, wherein the glass has a visible transmission of at least about 85%, and wherein the glass contains 0% cerium oxide. In this case, to compensate for yellow or yellow-green coloration a small amount of cobalt (Co) may be provided in the glass to enable it to realize a more neutral color.

As can be seen from the annexed table, some of the components and properties of the glasses disclosed in each of the references are within the same range, while others are different. Notwithstanding the overlap, Landa has issued as a patent.

The logical reason why Landa issued as a patent, and why applicants' glass also deserves patent protection, is that although some of the components and properties are more or less within the same ranges, the presence or absence of other components, their

valence states and their respective amounts in the glass, affect the properties and types of glasses which serve to distinguish them from each other.

For example, the iron in the silico-sodico-calcic glasses is present in two oxidation states: as ferrous ion (FeO) and ferric ion (Fe_2O_3). Each oxidation state confers different properties. The ferrous ion has a wide and strong absorption band centered at about 1050 nm, which is translated as a decrease of the infrared radiation. Also, this band extends toward the visible light region, thus diminishing the light transmission and imparting a bluish coloration to the glass. By contrast, the ferric ion presents a strong absorption band located in the ultraviolet region which impedes the transmission of ultraviolet radiation through the glass, and two other weak bands in the visible region located between 420 and 440 nm, which causes a slight decrease in light transmission and imparts a yellowish coloration to the glass.

Therefore, the coloration, its intensity and its properties (%UV transmission Light, IR) are functions of the balance between the two oxidation states and the total content of the iron oxide present in the glass.

Cobalt

The **cobalt** in the silico-sodico-calcic glasses is normally in its divalent state and presents a wide absorption band in the visible region centered at 590 nm, giving a **blue-violet** coloration, better known as **cobalt blue**, with a decrease in the light transmission. The decrease of the light transmission and the intensity of the coloration are a function of the amount of cobalt present in the glass. The cobalt does not affect the absorption in the ultraviolet region.

Chromium oxide

There are probably more different shades of green to be found in glass than any other color. It rivals the multitude of amber glass variations which, as noted below, can grade into various greens. The different greens are formed by a myriad of different coloring agents, impurities, and glass making processes. Iron, **chromium,** and copper all produce different green glass. **Chromium oxide** will produce yellowish green under

oxidizing conditions and emerald green under reducing conditions in the glass furnace (Dillon 1958). **Combinations such as cobalt (blue) mixed with chromium (green) will, not surprisingly, produce blue-green glass (Kendrick 1968; Munsey 1970).**

Titanium Dioxide

Papers have been written on the behavior of titanium dioxide **TiO_2** in the transmission of colorless glasses. i.e. Striple, J. H. "Titanium dioxide its effect on the transmission of various glasses", *The Glass Industry*/April 1964, pp 193-196. The author comments that the TiO_2 optically changes the light transmission to a major wavelength, extending the transmission range in the infrared and absorbing more in the ultraviolet.

The more stable form of titanium in the glass is the tetravalent (Ti^{+4}), which is colorless and, only the trivalent form (Ti^{+3}) produces color. However, this color is not found in soda-lime-silica glasses.

M. D. Beals in his paper, "Effects of Titanium Dioxide in Glass", ***Glass Industry***, September, 1963, pp 495-53, describes the interest that has been shown titanium dioxide as a constituent of glasses. The effects produced by the use of titanium dioxide include the comments that TiO_2 greatly increases the refractive index, increases the absorption of light in the ultraviolet region, and lowers the viscosity and surface tension. From the data on the use of titanium dioxide in enamels, it was noted that TiO_2 increases the chemical durability and acts as a flux. In general, clear glasses containing titanium dioxide may be found in all of the common glass-forming systems (borates, silicates, and phosphates). The various regions of glass formation for systems containing titanium dioxide are not grouped in any one place, since the organization of the discussion is based more on the properties than their use.

According to the claimed invention, a soda-lime-silica glass composition is provided which includes ferric oxide and titanium dioxide to produce a colorless glass with a high visible light transmission for use in the construction, appliances, glazing and automotive industry with a thickness of about 2 to 20 mm and, preferably, about 3.2 mm.

Regarding the non-statutory obviousness-type double patenting rejection based on co-pending Application No. 11/182,449, applicants submit herewith a Terminal Disclaimer.

In summary, applicants have found that:

1. The combination of two or more compounds have an additive effect in the absorption and, therefore, in the final properties of the product.

2. If cobalt oxide is added to a glass composition (Landa et al patent), it absorbs at about 590 nm (a combination iron oxide – cobalt oxide), the absorption could be compensated for and still achieve the desired neutral gray tonality, in addition to diminishing the light transmission.

3. The amounts, proportions and oxidation-reduction states of each of the colorants affect four (4) fundamental parameters in the properties of the product, which are: their transmissions in the three zones of the electromagnetic spectrum wherein the solar radiation resides, namely ultraviolet, visible and near infrared (and as a consequence the transmission of total heat), as well as the color to transmission of the glass.

In the present case, the claimed invention comprises a colorless glass composition having a base glass composition, comprising, in weight percentage: from 70 to 75% of SiO_2; from 10 to 15% of Na_2O; from 5 to 10% of CaO; from 0 to 5% of MgO; from 0.0 to 3% K_2O; from 0.1 to 1.0% Al_2O_3 3% and compounds consisting of from about 0.01 to 0.03% of Fe_2O_3; from about 20 to 30% reduction (Fe^{2+}) and from about 0.05 to 1% of TiO_2, the glass having a visible light transmission of at least 89%; an ultraviolet radiation transmittance of no more than 81%; solar direct transmittance of no more than 90%; a dominant wavelength from 600 nm to 490 nm; and a purity of less than 2%.

In other words, the color and properties of each particular glass, depends on the following factors: 1) The specific components present in the glass; 2) the valence state of each of the components; 3) the amounts of the specific components; and 4) the specific amounts of the other components.

Therefore, all of the above variables cannot simply be determined just by observation and analysis of the existing glasses, nor simply by experimental trials, since the alteration of one or more of these variables, leads to an entirely unexpected glass having specific properties. As such, the unique glasses of the present invention would not have been considered to be obvious to one of ordinary skill in the art at the time the invention was made. The Examiner's rejection is based solely on the use of impermissible hindsight, taking a piece here from one reference and pieces from several other references, and combining them only by virtue of using applicants' own disclosure as a template. It is respectfully submitted that the invention as a whole, as recited in claims 6-9, would have been completely and entirely unobvious to one of ordinary skill in the art at the time the present invention was made.

It is respectfully submitted that Applicants' claimed glass distinguishes over the respective teaching of each of the references and, accordingly, is unobvious. Withdrawal of the rejections under 35 U.S.C. 103 (a) is respectfully solicited.

Please charge any fees which may be due and which have not been submitted herewith to our Deposit Account No. 01-0035.

Respectfully submitted,

ABELMAN, FRAYNE & SCHWAB
Attorneys for Applicant

By 
Jay S. Cinamon
Attorney for Applicant
Reg. No. 24,156

666 Third Avenue
New York, NY 10017-5621
Tel.: (212) 949-9022
Fax: (212) 949-9190

Pub. No. US 2003/0114291	US Patent No. 7,169,722	US Patent No. 11/182449	US Patent No. 10/829093
1. A high transmittance glass sheet formed of a composition comprising silica as a main component and	Claim 1 A glass comprising: a base glass portion comprising: TABLE-US-00011 SiO.sub.2 at least 67% Na.sub.2O 10 to 20% CaO 5 to 15% MgO 0 to 8% Al.sub.2O.sub.3 0 to 5% K.sub.2O 0 to 5%	Claim 1. A glass composition with high visible light transmission and low ultraviolet light transmission having a base glass composition comprising, in weight percentage,	6. A colorless glass composition having a base glass composition, comprising, in weight percentage: from 70 to 75% of SiO.sub.2; from 10 to 15% of Na.sub.2O; from 5 to 10% of CaO; from 0 to 5% of MgO; from 0.0 to 3% K.sub.2O; from 0.1 to 1.0% Al.sub.2O.sub.3% and compounds consisting of
as coloring components, expressed in wt. %: **not less than 0.005% to less than 0.02% of total iron oxide in terms of Fe.sub.2O.sub.3 (T-Fe.sub.2O.sub.3);**	a colorant portion comprising: TABLE-US-00012 total iron (expressed Fe.sub.2O.sub.3):		from about 0.01 to 0.03% of Fe.sub.2O.sub.3;
			from about 20 to 30% reduction (Fe.sup.2+) and
	0.04 to 0.10% cobalt oxide:		
and not more than 0.25% of cerium oxide,		**from 0 to 0.6 wt % of cerium oxide,**	
less than 0.008% of FeO;		**less than 0.03 wt % of ferric oxide,**	
	0.1 to 15 ppm chromium oxide:		
	0 to 10 ppm titanium oxide. (Claim 2: 0 to 0.2% titanium oxide).	**from 0.05 to 1 wt % of titanium oxide**	**from about 0.05 to 1% of TiO.sub.2,**
	0 to 0.5% glass redox: <=0.10		
wherein the composition has a ratio (FeO ratio) of FeO in terms of Fe.sub.2O.sub.3 to T-Fe.sub.2O.sub.3 of lower than 40%.			
CLAIM 2. Wherein the glass sheet, on 4.0 mm thickness basis, a **dominat wavelength of 450 to 580 nm,**			a dominant wavelength from 600 nm to 490 nm;
	wherein the glass has **a visible transmission of at least about 85%,** and wherein the glass contains 0% cerium oxide. CLAIM 3. A visible transmission of at least 88%	the glass having **greater than 87% in visible luminous transmittance;**	the glass having a visible light transmission of at least 89%;
a solar radiation trasmittance of 87.% or higher		a solar direct transmittance no more than 90%.	solar direct transmittance of no more than 90%;
An excitation purity of 0.36% or lower			and a purity of less than 2%.
CLAIM 2. A visible light transmittance of 90% or higher,			
	CLAIM 4. and UV% transmission of no greater than about 75%	a UV light transmission less than 60% and more preferably less than 50%;	an ultraviolet radiation transmittance of no more than 81%;